

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Ulrike Reeh et al. Art Unit : 2815
Serial No. : 09/221,789 Examiner : Jerome Jackson, Jr.
Filed : December 28, 1998
Title : LIGHT-RADIATING SEMICONDUCTOR COMPONENT WITH A
LUMINESCENCE CONVERSION ELEMENT

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INFORMATION DISCLOSURE STATEMENT

Applicants request consideration of the references listed on the attached PTO-1449 form. Under 37 C.F.R. § 1.98 (a)(2)(ii), only copies of foreign patent documents and/or non-patent literature are enclosed. Copies of any listed U.S. patents or U.S. patent application publications can be provided upon request. A copy of a communication from a foreign patent office in a counterpart application is also enclosed.

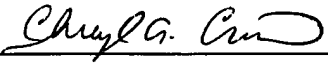
This statement is being filed a Request for Continued Examination. Each item of information in this statement (i) was cited in a communication from a foreign patent office in a counterpart foreign application, the communication being dated February 28, 2005, which is not more than three months prior to the filing of this statement, and (ii) was not first cited in any

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Applicant : Ulrike Reeh et al.
Serial No. : 09/221,789
Filed : December 28, 1998
Page : 2 of 2

Attorney's Docket No.: 12406-003001 / 1996P1650 US
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communication from a foreign patent office in a counterpart application which was more than three months prior to the filing date of this statement. Please apply any other charges or credits to deposit account no. 06-1050, referencing 12406-003001.

Respectfully submitted,

Date: _____

3/22/5



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Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 12406-003001	Application No. 09/221,789
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Ulrike Reeh et al.	
		Filing Date December 28, 1998	Group Art Unit 2815

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	3,529,200	09/15/1970	Potter et al.			
	AB	3,774,086	11/20/1973	Vincent, Jr.			
	AC	3,787,684	01/22/1974	Isenberg			
	AD	5,379,186	01/03/1995	Gold et al.			
	AE						
	AF						
	AG						

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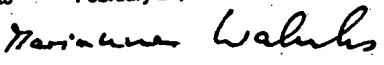
Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AH	49-122292	11/22/1974	Japan			X	
	AI	52-009334	01/24/1977	Japan			Abstract Only	
	AJ							
	AK							
	AL							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AM	
	AN	
	AO	
	AP	

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

		for EPO use only
V. Opposition is filed against — the patent as a whole <input checked="" type="checkbox"/> — claim(s) No(s). <input type="text"/>		
VI. Grounds for opposition: Opposition is based on the following grounds: (a) the subject-matter of the European patent opposed is not patentable (Art. 100(a) EPC) because: — it is not new (Art. 52(1); 54 EPC) <input type="checkbox"/> — it does not involve an inventive step (Art. 52(1); 56 EPC) <input checked="" type="checkbox"/> — patentability is excluded on other grounds, i. e. <input type="text"/> Art. <input type="text"/> (b) the patent opposed does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Art. 100(b) EPC; see Art. 83 EPC). <input type="checkbox"/> (c) the subject-matter of the patent opposed extends beyond the content of the application/ of the earlier application as filed (Art. 100(c) EPC; see Art. 123(2) EPC). <input type="checkbox"/>		
VII. Facts and arguments (Rule 55(c) EPC) presented in support of the opposition are submitted herewith on a separate sheet (annex 1)		<input checked="" type="checkbox"/>
VIII. Other requests: Oral Proceedings in accordance with Art. 116 EPC are requested in case the request for revocation of the patent is not granted in the written procedure.		

IX. Evidence presented		for EPO use only
<div>Enclosed = <input checked="" type="checkbox"/></div> <div>will be filed at a later date = <input type="checkbox"/></div>		
A. Publications:		Publication data
1 US 3,932,881 A (document O1) ✓✓ Particular relevance (page, column, line, fig.):		
2 US 3,774,086 A (document O2) Particular relevance (page, column, line, fig.):		
3 US 3,593,055 A (document O3) ✓✓ Particular relevance (page, column, line, fig.):		
4 US 3,529,200 A (document O4) ✓✓ Particular relevance (page, column, line, fig.):		
5 JP 49-122292 A (Japanese Laid-Open Patent Application) (document O5) Particular relevance (page, column, line, fig.):		
6 JP 52-009334 B (Japanese Utility Model Publication) (document O6) Particular relevance (page, column, line, fig.):		
7 US 3,787,684 A (document O7) ✓ Particular relevance (page, column, line, fig.):		
Continued on additional sheet <input type="checkbox"/>		
B. Other evidence		
Further publications:		
8 US 5,379,186 A (document O8)		
9 EP 0 486 052 A1 (document O9) ✓✓		
10 DE 38 04 293 A1 (document O10) ✓✓		
Continued on additional sheet <input type="checkbox"/>		

		for EPO use only																																	
X. Payment of the opposition fee is made <input checked="" type="checkbox"/> as indicated in the enclosed voucher for payment of fees and costs (EPO Form 1010) <input type="checkbox"/>																																			
XI. List of documents: <table border="0"> <thead> <tr> <th>Enclosure No.:</th> <th></th> <th>No. of copies</th> </tr> </thead> <tbody> <tr> <td>0</td> <td><input checked="" type="checkbox"/> Form for notice of opposition</td> <td>2 (min. 2)</td> </tr> <tr> <td>1</td> <td><input checked="" type="checkbox"/> facts and arguments (see VII.)</td> <td>2 (min. 2)</td> </tr> <tr> <td>2</td> <td colspan="2">Copies of documents presented as evidence (see IX.)</td> </tr> <tr> <td>2a</td> <td><input checked="" type="checkbox"/> — Publications</td> <td>(min. 2 of each)</td> </tr> <tr> <td>2b</td> <td><input type="checkbox"/> — Other documents</td> <td>(min. 2 of each)</td> </tr> <tr> <td>3</td> <td><input type="checkbox"/> Signed authorisation(s) (see IV.)</td> <td></td> </tr> <tr> <td>4</td> <td><input checked="" type="checkbox"/> Voucher of payment of fees and costs (see X.)</td> <td>1</td> </tr> <tr> <td>5</td> <td><input checked="" type="checkbox"/> Cheque</td> <td>1</td> </tr> <tr> <td>6</td> <td><input type="checkbox"/> Additional sheet(s)</td> <td>(min. 2 of each)</td> </tr> <tr> <td>7</td> <td><input type="checkbox"/> Other (please specify here):</td> <td></td> </tr> </tbody> </table>		Enclosure No.:		No. of copies	0	<input checked="" type="checkbox"/> Form for notice of opposition	2 (min. 2)	1	<input checked="" type="checkbox"/> facts and arguments (see VII.)	2 (min. 2)	2	Copies of documents presented as evidence (see IX.)		2a	<input checked="" type="checkbox"/> — Publications	(min. 2 of each)	2b	<input type="checkbox"/> — Other documents	(min. 2 of each)	3	<input type="checkbox"/> Signed authorisation(s) (see IV.)		4	<input checked="" type="checkbox"/> Voucher of payment of fees and costs (see X.)	1	5	<input checked="" type="checkbox"/> Cheque	1	6	<input type="checkbox"/> Additional sheet(s)	(min. 2 of each)	7	<input type="checkbox"/> Other (please specify here):		
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XII. Signature of opponent or representative Place Pöcking Date February 25, 2005  Marianne Wakulis Please print name under signature. In the case of legal persons, the position which the person signing holds within the company should also be printed.																																			

Facts and Arguments

(Rule 55 (c) EPC):

I. The Prior Art

During the prosecution, the following documents were cited and are considered to be relevant:

**PATENT ABSTRACTS OF JAPAN, vol. 096, no. 005, May 31, 1996 &
JP 08 007614 A (document D1);**

**PATENT ABSTRACTS OF JAPAN, vol. 017, no. 542 (E-1441), September 29, 1993
& JP 05 152609 A (document D2);**

DE 90 13 615 U (document D3);

DE 33 15 675 A (document D4).

Moreover, the following additional prior art documents are hereby introduced into the proceedings:

US 3,932,881 A (document O1)

US 3,774,086 A (document O2)

US 3,593,055 A (document O3)

US 3,529,200 A (document O4)

JP 49-122292 A (Japanese Laid-Open Patent Application) (document O5)

JP 52-009334 B (Japanese Utility Model Publication) (document O6)

US 3,787,684 A (document O7)

US 5,379,186 A (document O8)

EP 0 486 052 A1 (document O9)

DE 38 04 293 A1 (document O10)

For documents O5 and O6, an English translation of relevant parts of the Japanese language documents is provided.

The part of document O5 that has been translated is in the original Japanese document as follows:

- title page (complete); and
- page 2, col. 3, line 18, to col. 6, line 19.

The part of document O6 that has been translated is in the original Japanese document as follows:

- page 2, col. 3, lines 15-23

Of the above documents, while documents D1, O3, O6 and O9 are considered to be most relevant to the subject matter of the granted claims of the opposed patent, the other documents are also considered important, in particular for assessment of inventive step.

II. Novelty and Inventive Step

For considering inventive step, one would determine the closest prior art and the differences of the claimed subject matter over this prior art. The closest prior art is that document which has the most features in common or which has the most similar purpose.

Claim 1:

It has been agreed among the Examiner and the Patentee during the examination procedure that **document D1** is to be used as the closest reference. The Opponent concurs with this assessment for the time being, but suggests that also any of **documents O3, O6 or O9** could be considered to represent the closest prior art, in which case a combination of (i) **document O3** and either one of **documents D1 or D2** or (ii) **document O6** and either one of **documents D1 or D2** or (iii) **document O9** and either one of **documents D1 or D2** would render the subject matter of claim 1 obvious.

Claim 1 of the opposed patent reads as follows:

1. Light emitting semiconductor component
 - having a semiconductor body (1), which emits electromagnetic radiation during operation of said semiconductor component,
 - having at least one first and at least one second electrical terminal (2, 3), which are electrically conductively connected to said semiconductor body (1), and
 - having a luminescence conversion element, which has at least one luminescent material,

in which

 - said semiconductor body (1) has a semiconductor layer sequence (7) which is suitable for emitting electromagnetic radiation of a first wavelength range from the ultraviolet, blue and/or green spectral region during operation of the semiconductor component,
 - the luminescence conversion element converts a radiation originating from the first wavelength range into radiation of a second wavelength range, which differs from the first range of wavelengths, in such a way that the semiconductor component emits mixed radiation, comprising radiation of the first wavelength range and radiation of the second wavelength range, and
 - a luminescence conversion layer (4) is provided as said luminescence conversion element above or on the semiconductor body (1),

characterized in that

- the luminescence conversion layer (4) has a constant thickness throughout.

Document D1 discloses all features of the preamble of claim 1. This has also been admitted by the Patentee.

The problem to be solved by the features of the characterizing portion are only very generally described in the patent e. g. in col. 2, lines 34-39 where a homogeneous mixed color light and simple manufacture with reproducible characteristics are mentioned as the object of the invention.

It is, however, not entirely clear to which extent the constant thickness of the luminescence conversion layer actually contributes to the solution of the stated problem.

In any case, the feature of a luminescence conversion layer having a constant thickness is known e. g. from **documents O3, O6, and O9**.

In **document O3**, the phosphor layer 16 in Fig. 2 has a constant thickness throughout, as seen in the radial direction. Moreover, the phosphor layer 16 in Fig. 2 has the same function and is arranged in the same manner as the phosphor layer 8 in Fig. 1 of **O3**. Phosphor layer 8 in Fig. 1 of **O3** is described as serving the function of converting a radiation of a first wavelength range into a radiation of a second wavelength range (cf. **O3**, col. 2, lines 46-48).

In **document O6**, the phosphor layer 6 has a constant thickness, as may be seen clearly in the only figure of **O6**. Also, phosphor layer 6 in Fig. 1 of **O6** is described as converting a radiation of a first wavelength range into a radiation of a second wavelength range (cf. the translated passage from **O6**, col. 2, lines 46-48). Also, in **document O6**, it is described that the phosphor layer 6 converts the light *uniformly*.

In **document O9**, the photoluminescent layer 14 has a constant thickness throughout, as may be seen from Figs. 1 and 2 of **O9**.

It would thus be obvious for a man skilled in the art to use a uniform thickness for the luminescence conversion layer.

The dependent claims:

The dependent claims 2 to 27 are normal design practice or an obvious use and cannot impart inventive step to claim 1 when combined therewith. In order to avoid repetitions, reference may be had to the Annex of the International Preliminary Examination Report (see in particular Section II, Nos. 1-14) or the Official Communication from the European Patent Office dated October 15, 2001 (see in particular points 4 and 5 where the dependent claims and their lack of inventive merit are discussed in detail).

Therefore, at least for the above reasons, the patent should be revoked.

Moreover, the following is noted with regard to further prior art documents:

Document O1 discloses an electroluminescent device including a luminescent material (single crystal) 35 having a constant thickness (with the exception of an indentation for the dome-shaped mass 34).

Document O2 discloses a solid state lamp emitting mixed color light wherein part of the radiation emitted by a semiconductor body and having a first wavelength is converted by a luminescence conversion element (phosphor material 26) into radiation having a second wavelength.

Document O4 discloses a light-emitting phosphor-diode combination.

Document O5 discloses a light-emitting diode with a light conversion function. As may be gathered from the last sentence in the first paragraph of the English translation of page 2, col. 3, line 18 to col. 6, line 19 of O5, "the thickness of the

phosphor layer 7 is always constant". It can also be seen that the phosphor layer 7 is provided directly on the semiconductor body or pellet 6.

Document O7 discloses a device having utility as a radiation source. A thin layer, film or coating of a radiation emitting phosphor 28 is provided. The phosphor layer 28 appears to have a constant thickness throughout.

Document O8 discloses an electronic component being encapsulated by various layers of constant thickness.

Regarding **document O9**, it is noted that this document discloses all features of claim 1 except for the first wavelength range being in the ultraviolet, blue and/or green spectral range. In **document O9**, the radiation emitted from the active layer 18 is described as being 780 nm. More particularly, taking reference to Figs. 1 and 2 of **document O9** as well as the associated description in col. 2, line 40 through col. 6, line 23, **document O9** discloses a light emitting semiconductor component having a semiconductor body (10), which emits electromagnetic radiation during operation of said semiconductor component, having at least one first and at least one second electrical terminal (24, 26), which are electrically conductively connected to said semiconductor body (10), and having a luminescence conversion element (14), which has at least one luminescent material, in which said semiconductor body (10) has a semiconductor layer sequence (layers 16, 18, 20, 22 etc.) which is suitable for emitting electromagnetic radiation of a first wavelength range during operation of the semiconductor component, the luminescence conversion element (14) converts a radiation originating from the first wavelength range into radiation of a second wavelength range, which differs from the first range of wavelengths, in such a way that the semiconductor component emits mixed radiation, comprising radiation of the first wavelength range and radiation of the second wavelength range (cf. col. 4, lines 7-11 and 22-25), and a luminescence conversion layer (14) is provided as said luminescence conversion element (above or) on the semiconductor body (10), and the luminescence conversion layer (14) has a constant thickness throughout.

Thus, the only difference remaining between the disclosure of **document O9** and the claimed subject matter of claim 1 of the opposed patent is the wavelength of the first

radiation. However, it would be obvious to use the same structure as disclosed in **document O9** also for light having different wavelengths, in particular since semiconductor components emitting radiation from the ultraviolet, blue and/or green spectral region are known in the art (see e. g. **documents D1 or D2**).

Document O10 discloses a light emitting arrangement including a diode and a luminescence conversion element.

In view of the above, revocation of the opposed patent in its entirety is justified.